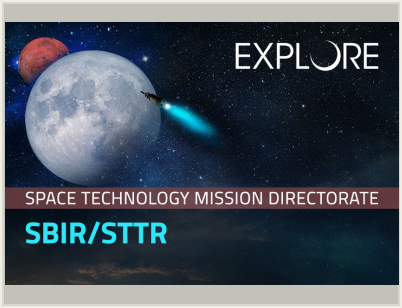
Dust-Tolerant, Reusable Connection Mechanism for Lunar Environments, Phase II

Completed Technology Project (2009 - 2011)

Project Introduction

Lunar dust has been identified as a significant and present challenge in future exploration missions. Significant development is called for in the area of devices and structures that tolerate or mitigate the presence of Lunar dust. Honeybee Robotics Spacecraft Mechanisms Corporation (SMC) seeks to develop methods for mitigating dust accumulation on reusable connection mechanisms, such as will be necessary for Lunar extra-vehicular activity and surface systems equipment. Honeybee has heritage in developing mechanisms for extreme, dusty environments. Near-term applications of such a connector include the utility and electrical connections that will be used on the next-generation Lunar EVA suit being developed for NASA JSC by Oceaneering Space Systems, as well as cryogenic utility connections that will be used to pass liquid hydrogen and liquid oxygen during in-situ¬ resource utilization (ISRU) activities. The Phase 1 research has resulted in the development of a dust-tolerant, manual electrical connector for the battery recharge circuit of the Portable Life Support Backpack (PLSB) being developed for the Constellation configuration two (Lunar EVA) suit. Phase 1 breadboard testing showed 53 successful mate/de-mate cycles in the presence of JSC-1AF simulant prior to failure. In addition, this failure appears to be the result of a late addition to the mechanical configuration that can be revised for even better performance. In Phase II, Honeybee will revise the design of the dust-tolerant connector, investigate design configurations for utility connections for ISRU activities, and test a connector brassboard in a chamber capable of closely reproducing conditions on the Lunar surface. This effort will lead to the development of a dust-tolerant electrical connector with a focused application to the Constellation configuration two (Lunar EVA) suits. This will result in a TRL 6 Lunar dust-tolerant electrical connector.



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Johnson Space Center (JSC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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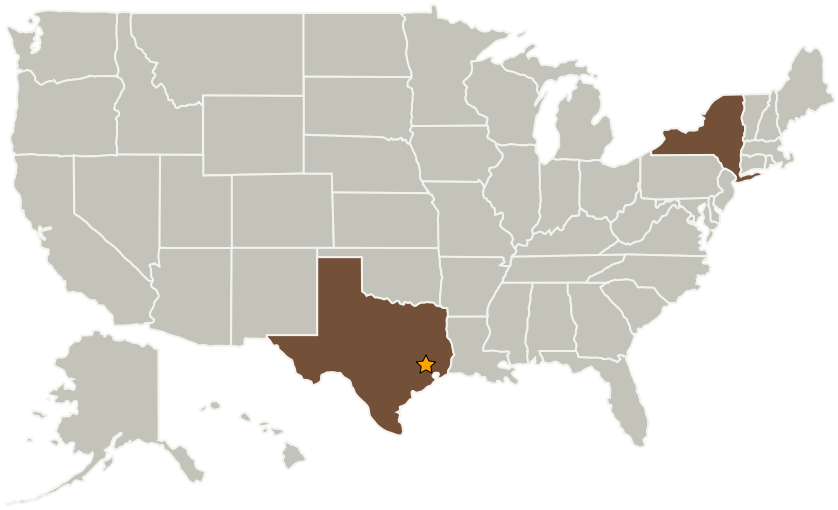
Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
★Johnson Space Center(JSC)	Lead Organization	NASA Center	Houston, Texas
Honeybee Robotics, Ltd.	Supporting Organization	Industry	Pasadena, California

Primary U.S. Work Locations	
New York	Texas

Project Transitions

January 2009: Project Start

August 2011: Closed out

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX07 Exploration Destination Systems
  - TX07.1 In-Situ Resource Utilization
    - TX07.1.1 Destination Reconnaissance and Resource Assessment